

The Howard Bank

111 Main Street, P.O. Box 409
Burlington, Vermont 05402-0409
(802) 658-1010

DEC 9 1991

December 6, 1991

Chuck Schwer
Department of Environmental Conservation
Hazardous Material Management Division
103 South Main Street
Waterbury, VT 05671-0404

Dear Chuck:

Enclosed please find a copy of a report on the continuing site investigation for our 2228 North Winooski, Ave., Burlington property. After you have had a chance to review the report please give me a call so that we can meet to discuss the findings. Should you have any questions, please do not hesitate to contact me or Brad Wheeler at the Johnson Company. Please let me know if we can not meet before December 23rd.

Thank you for your assistance.

Sincerely,



Michael R. Tuttle
Vice President

Enclosure

12125.929

CONTINUING SITE INVESTIGATION
of
228 North Winooski Avenue, Burlington, Vermont

Prepared for

THE HOWARD BANK
Burlington, Vermont

November 1991

Prepared by:

THE JOHNSON COMPANY, INC.
5 State Street - Montpelier, Vermont 05602
(802)229-4600
ENVIRONMENTAL SCIENCES AND ENGINEERING

EXECUTIVE SUMMARY

This report provides information on the procedures, results and conclusions of continuing work performed by The Johnson Company, Inc. at the Howard Bank property at 228 North Winooski Avenue, Burlington, Vermont. The work that was performed included the collection of 37 soil samples and the installation of one groundwater monitoring well. This work was conducted in the area where tetrachloroethene contaminated soil had been documented through past investigations by The Johnson Company.

These tasks have been carried out in an effort to learn more about the nature of the contamination that was documented during the earlier phases of this investigation, as discussed in the May 1991 report.

Following are the key results obtained from this investigation:

- 1) Tetrachloroethene was detected at levels above the Vermont Department of Environmental Conservation (VT DEC) draft soils policy standard in 15 of the 31 soil samples analyzed from the site. The VT DEC draft policy standard for soils is a "rule of thumb" whereby the contaminant concentration in the soil sample is divided by 20, then compared to the Vermont Groundwater Protection Rule and Strategy Enforcement Standard for that contaminant. If the quotient is equal to or higher than the groundwater standard, the contamination in the soil sample exceeds the draft enforcement standard for soils. For tetrachloroethene, this level is 14 parts per billion (ppb). Concentrations of tetrachloroethene in ten of the samples were below the practical quantitation limit (BPQL) of 2 ppb, six ranged from 2 to 12 ppb, six ranged from 16 to 19 ppb, five ranged from 49 to 77 ppb and four ranged from 104 to 382 ppb.
- 2) A groundwater sample collected on October 21, 1991 from the groundwater monitoring well installed on site was found to contain 13 ppb of tetrachloroethene. The Vermont Groundwater Protection Rule and Strategy Enforcement Standard for tetrachloroethene is 0.7 ppb. The water table was measured at approximately 52 feet below the ground surface (bgs).
- 3) A second groundwater sample collected on November 14, 1991 from the same well was found to contain 42 ppb of tetrachloroethene.
- 4) The soil contamination detected probably extends off the site to the north of the subject property. This is based on the soil sample data which shows a trend of increasing concentrations in the direction of the property line. The sample with the highest concentration was collected approximately 12 feet from the property line.
- 5) The direction of groundwater flow at this site has not been determined.
- 6) Pavement covers most of the ground surface of the subject property.
- 7) Soils sampled from 30 feet to 62 feet bgs were not contaminated even though contaminated soil was found at shallower depths in the same boring.

The soils are not contaminated at levels high enough to present a health risk through direct contact, (based on U.S. EPA direct exposure standards). Based on the available data, it appears that the groundwater contamination documented on the site may be originating from an off site source, rather than leaching from the contaminated soils on the site. Remediation efforts to clean up the groundwater in this area, if required, would probably need to include a location north of the northern property line of 228 North Winooski Avenue. Therefore, soil remediation at this property alone is not considered to be productive.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
TABLE OF CONTENTS	iii
LIST OF FIGURES	iv
LIST OF TABLES	iv
LIST OF APPENDICES	iv
1.0 INTRODUCTION	1
2.0 SOIL SAMPLES	1
2.1 SAMPLE COLLECTION	1
2.2 RESULTS	3
3.0 GROUNDWATER SAMPLING	6
3.1 MONITORING WELL INSTALLATION	6
3.2 RESULTS	6
4.0 CONCLUSIONS AND RECOMMENDATIONS	6
4.1 CONCLUSIONS	6
4.2 RECOMMENDATIONS	7
5.0 LIMITATIONS	8

LIST OF FIGURES:

- Figure 1 - Site Location Map
- Figure 2 - Soil Sample & Monitoring Well Locations with Analytical Results - 228 No. Winooski Ave., Burlington, Vermont

LIST OF TABLES:

- Table 1 - Summary of Soil Sample Laboratory Data

LIST OF APPENDICES:

- A - Soil Sample Laboratory Data Sheets
- B - Drilling and Well Construction Log for Monitoring Well 1
- C - Groundwater Sampling Laboratory Data Sheet
- D - Chain of Custody Records

1.0 INTRODUCTION

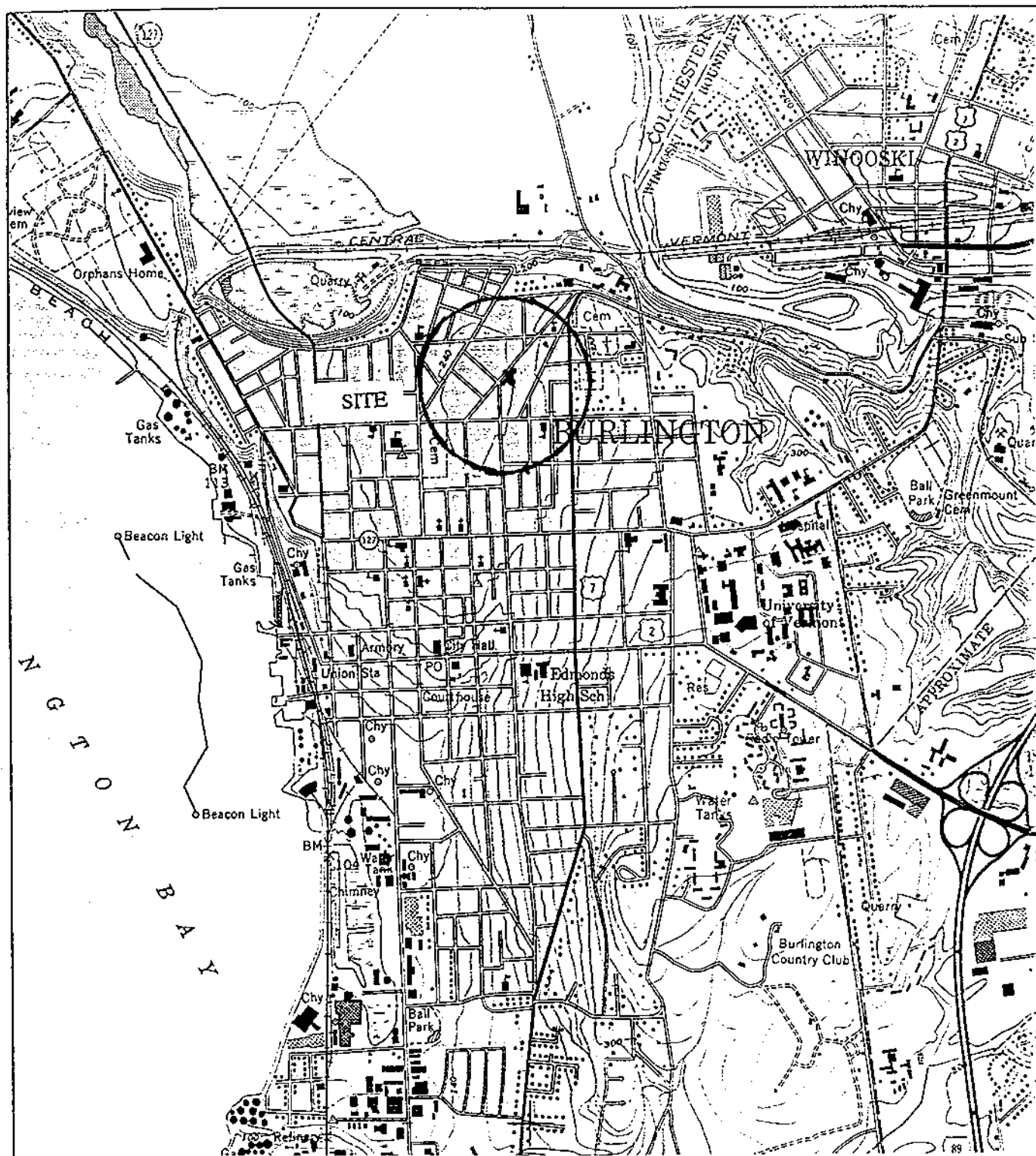
The Johnson Company, Inc. was hired by The Howard Bank, N.A. to continue the investigation of the documented soil contamination at 228 North Winooski Avenue, Burlington, Vermont. The purpose of this phase of the investigation was to more fully characterize the extent of the tetrachloroethene contamination at this site. This included the collection of soil samples and the installation of a groundwater monitoring well for groundwater sampling.

Previous investigative work that has been conducted at this site is discussed in detail in two separate reports. The first one, from December 1990, is entitled, "Environmental Site Assessment of 228 North Winooski Avenue, 198.5 North Union Street, Burlington, Vermont and 1907 Williston Road, South Burlington, Vermont for The Howard Bank". The second report, submitted in May 1991 is entitled, "Continuing Site Investigations of 228 North Winooski Avenue, 198.5 North Union Street, Burlington, Vermont and 1907 Williston Road, South Burlington, Vermont for The Howard Bank". The first investigation at this site included soil samples from under the underground gasoline storage tanks that were located between the building and North Winooski Avenue (see Figure 2). Sample T-2 had 50 ppb tetrachloroethene and sample T-1 was Below the Practical Quantitation Limit (BPQL). These samples were collected on October 30, 1990 and analyzed using EPA method 8010 and 8020. On April 10, 1991, ten soil samples were collected from five separate borings across the property. Of these, only the samples collected in the northwest corner of the property showed contamination. The sample collected from 5 feet below ground surface (bgs) was 93 ppb and the sample from 10 feet bgs was 55 ppb. These samples were analyzed using EPA method 8240.

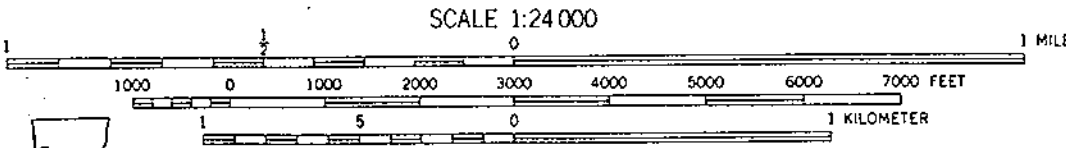
2.0 SOIL SAMPLES

2.1 SAMPLE COLLECTION

The analysis of soil samples collected earlier at this site indicated that soil contamination is limited generally to the northwest corner of the property. To further characterize the extent of this contamination both vertically and horizontally, seven soil borings were performed. In each of these borings, soil samples were collected at four separate depths bgs: approximately 1 foot bgs, 5 to 7 feet bgs, 10 to 12 feet bgs and 15 to 17 feet bgs. Additionally, one of the holes was used for the installation of a groundwater monitoring well. This hole was drilled to 60 feet bgs. Soil samples were collected at 5 foot intervals throughout the depth of this hole. A total of 37 soil samples were collected. With the exception of the samples collected from 1 foot bgs, which were collected by hand from the bore hole, all of the soil samples were collected using a split spoon sampler. All equipment used for sample collection, including the augers, the split spoon samplers and gloves, were decontaminated between each sample and each new boring. This was done in order to minimize the potential for cross contamination between samples. Decontamination of equipment included using a steam cleaner and a



N



QUADRANGLE LOCATION

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Ref: U.S. Geological Survey
15' Quadrangle Map
Burlington, Vermont
1948, Photorevised 1987

CHARRETTE

Figure 1
Mayo Property - N. Winooski Ave & N. Union St.
Site Location Map

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
MONTPELIER, VERMONT 05602

Scale
Drawn by
Checked by
Date
Dwg No.

rinsing bucket. The samples were kept in a cooler on ice and sent under chain of custody procedures to Scitest Laboratory Services in Randolph, Vermont. They were analyzed using EPA method 8010 and percent solids. Analysis was limited to EPA M8010 since previous 6C/MS methods detected only tetrachloroethene. The approximate locations of these samples are shown on Figure 2.

2.2 RESULTS

Tetrachloroethene at levels above the VT DEC draft policy for contaminated soil was detected in 15 of the 31 soil samples analyzed from the site. The draft policy for soils is a "rule of thumb" whereby the contaminant concentration in the soil sample is divided by 20, then compared to the Vermont Groundwater Protection Rule and Strategy Enforcement Standard for that contaminant. If the quotient is equal to or higher than the groundwater standard, the contamination in the soil sample exceeds the draft policy standard for soils. For tetrachloroethene, this level is 14 ppb. Ten of the samples were below the practical quantitation limit, (BPQL), six ranged from 2 to 12 ppb, six ranged from 16 to 19 ppb, five ranged from 49 to 77 ppb and four ranged from 104 to 382 ppb. Table 1 shows the results of the analysis for each sample and provides a brief description of the soil material from which the sample was taken. Figure 2 shows the analytical results beside each sample location. Figure 2 shows an apparent trend of higher readings toward the northern edge of the sampling area. It indicates that the soil contamination probably extends onto the neighboring property to the north. At this point, we do not know what the origin of the contamination is, or even if it originates from 228 North Winooski Avenue, but the soil descriptions from Table 1 indicate that it is likely that the contamination was introduced onto the site with the ashy fill material that underlies part of this part of the property. Some of the data that leads us to suspect that there is a connection between the ashy fill and the tetrachloroethene contamination are as follows:

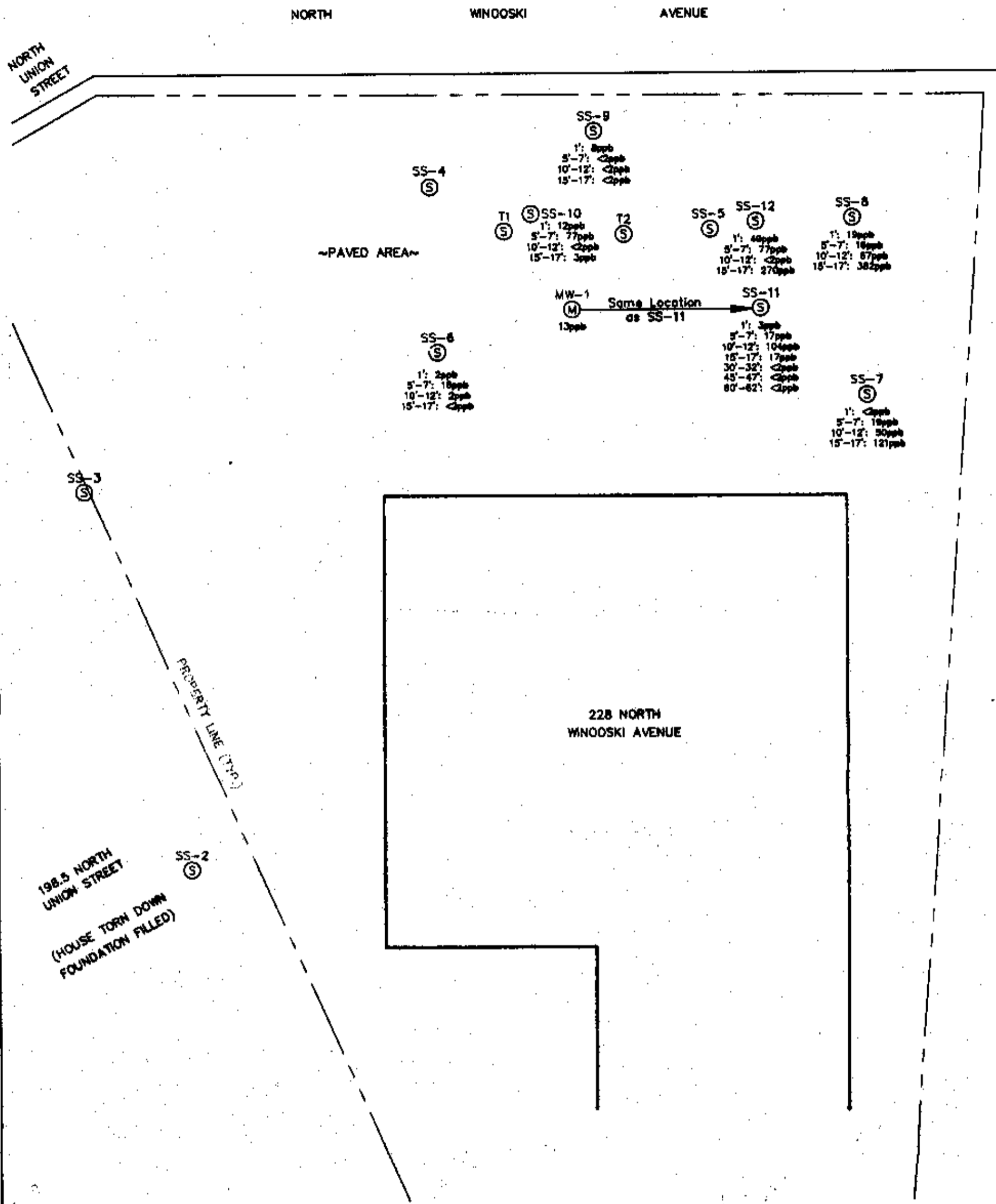
1. Ten of the samples were from soils that were described as having ashy fill in them. In these samples, the ashy fill was readily visible, in the other samples it was not. In these ten samples the concentration of tetrachloroethene ranged from 16 ppb to 382 ppb. The mean is 102.8 ppb for these ten samples.
2. Of the 21 samples that were analyzed but did not contain ashy material, ten were BPQL, five ranged from 2 to 8 ppb and the remaining six samples ranged from 12 to 121 ppb. The mean for these 21 samples is 14.4 ppb.
3. The data also shows that typically, occurrences at the higher end of the measured range of contamination in non-ashy soil samples is seen below samples that contained ash. Typically, samples that did not contain ash and were not overlain by ash containing soils, had relatively low levels of contamination or were "clean".

Laboratory data sheets for the soil samples are in Appendix A.

TABLE 1
SUMMARY OF SOIL SAMPLE LABORATORY DATA

SAMPLE NUMBER	APPROXIMATE DEPTH (FEET bgs)	TETRACHLOROETHENE (ppb)	SOIL DESCRIPTION
6-1	1	2	brown sandy fill
6-2	5-7	16	gray ashy fill
6-3	10-12	2	brown sand
6-4	15-17	BPQL	olive fine sand
7-1	1	BPQL	brown fine sand
7-2	5-7	19	ashy fill
7-3	10-12	50	brown fine sandy loam with ashy fill
7-4	15-17	121	light brown fine sand
8-1	1	19	dark brown fine sand
8-2	5-7	16	brown fine sandy loam with some ashy fill
8-3	10-12	67	tan fine sand and dark brown loamy fine sand
8-4	15-17	382	brown fine sand fill with some ash and brick
9-1	1	8	brown sand
9-2	5-7	BPQL	tan fine sand
9-3	10-12	BPQL	gray sand
9-4	15-17	BPQL	gray very fine sand
10-1	1	12	brown sand
10-2	5-7	77	ashy fill
10-3	10-12	BPQL	tan sand
10-4	15-17	3	tan sand
11-1	1	3	dark brown loamy fine sand
11-2	5-7	17	brown loamy fine sand, some ashy fill
11-3	10-12	104	dark brown fine sandy loam fill, some ash
11-4	15-17	17	light brown fine sand
11-7	30-32	BPQL	gray fine sand
11-10	45-47	BPQL	gray very fine sandy loam
11-13	60-62	BPQL	gray silty clay loam and silt loam
12-1	1	49	dark brown sand
12-2	5-7	77	dark brown sand fill with some ash
12-3	10-12	BPQL	brown fine sand
12-4	15-17	270	dark brown fine sand fill with some ash

Definitions: bgs - below ground surface
 ppb - parts per billion
 BPQL - Below Practical Quantitation Limits



KEY

SS-1
1'-2': 8ppb
5'-7': 77ppb
10'-12': <2ppb
15'-17': 3ppb

MW-1
13ppb

SOIL SAMPLE LOCATION WITH SAMPLE DEPTHS AND TETRACHLOROETHENE CONCENTRATIONS IN PARTS PER BILLION

MONITORING WELL LOCATION WITH WATER SAMPLE TETRACHLOROETHENE CONCENTRATION IN PARTS PER BILLION

SS-1



SCALE: 1"=10'

NOTE: ALL DISTANCES AND LOCATIONS ARE APPROXIMATE

FIGURE 2

SOIL SAMPLE & MONITORING WELL LOCATIONS WITH ANALYTICAL RESULTS
228 N. WINOOSKI AVE., BURLINGTON, VT

THE JOHNSON COMPANY, INC.
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MONTPELIER, VERMONT

APPENDIX A

SOIL SAMPLE LABORATORY DATA SHEETS



P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-6313

LABORATORY REPORT

CLIENT NAME: The Johnson Company DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91 DATE OF ANALYSIS: 10/18/91
PROJECT NO: 78611 DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler

PARAMETER	6-1	6-2	6-3	6-4
Chloromethane	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethene	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	2	16	2	BPQL
Chlorobenzene	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
% Solids	93	74	96	95

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride

2 ppb for All other parameters.

LABORATORY REPORT

CLIENT NAME: The Johnson Company	DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington	DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91	DATE OF ANALYSIS: 10/18/91
PROJECT NO: 78611	DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler	

PARAMETER	10-1	10-2	10-3	10-4	10-4 Rep
Chloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	12	77	BPQL	3	BPQL
Chlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
% Solids	92	82	97	82	82

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride

2 ppb for All other parameters.

Page 2 of 9

LABORATORY REPORT

CLIENT NAME:	The Johnson Company	DATE OF SAMPLE:	10/12/91
PROJECT NAME:	Howard Bank, Burlington	DATE OF RECEIPT:	10/16/91
LABORATORY NO:	1468-91	DATE OF ANALYSIS:	10/18/91
PROJECT NO:	78611	DATE OF REPORT:	11/6/91
ATTENTION:	Brad Wheeler		

PARAMETER	11-1	11-1 Rep	11-2	11-3	11-4
Chloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichlorethene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	3	BPQL	17	104	17
Chlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
% Solids	89	89	88	78	86

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride
2 ppb for All other parameters.

LABORATORY REPORT

CLIENT NAME: The Johnson Company	DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington	DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91	DATE OF ANALYSIS: 10/18/91
PROJECT NO: 78611	DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler	

PARAMETER	12-1	12-1 Rep	12-2	12-3	12-4
Chloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	49	40	77	BPQL	299
Chlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
% Solids	89	89	88	90	78
	Notel		Notel		Notel

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride

2 ppb for All other parameters.

Note 1: Soil samples picked up methylene chloride from lab extractions run the same day. A representative sample was rerun and the methylene chloride level was below practical quantitation limit.

Page 4 of 9

LABORATORY REPORT

CLIENT NAME: The Johnson Company	DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington	DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91	DATE OF ANALYSIS: 10/25/91
PROJECT NO: 78611	DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler	

PARAMETER	7-1	7-2	7-3	7-4
Chloromethane	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethene	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	BPQL	19	50	122
Chlorobenzene	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
% Solids	93	69	84	87

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride

2 ppb for All other parameters.

Page 5 of 9

LABORATORY REPORT

CLIENT NAME: The Johnson Company DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91 DATE OF ANALYSIS: 10/25/91
PROJECT NO: 78611 DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler

PARAMETER	8-1	8-2	8-3	8-4
Chloromethane	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL
1,1-Dichlorethene	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	19	16	67	382
Chlorobenzene	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL
% Solids	92	90	90	87

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride
2 ppb for All other parameters.

LABORATORY REPORT

CLIENT NAME: The Johnson Company	DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington	DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91	DATE OF ANALYSIS: 10/18/91
PROJECT NO: 78611	DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler	

PARAMETER	9-1	9-1 Rep	9-2	9-3	9-4
Chloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichlorethene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL	BPQL	BPQL
Tetrachloroethylene	8	11	BPQL	BPQL	BPQL
Chlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL	BPQL	BPQL
% Solids	92	92	92	97	79

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride

2 ppb for All other parameters.

Page 7 of 9

LABORATORY REPORT

CLIENT NAME: The Johnson Company	DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington	DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1468-91	DATE OF ANALYSIS: 10/25/91
PROJECT NO: 78811	DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler	

PARAMETER	11-7	11-10	11-13
Chloromethane	BPQL	BPQL	BPQL
Bromoform	BPQL	BPQL	BPQL
Bromomethane	BPQL	BPQL	BPQL
Dibromochloromethane	BPQL	BPQL	BPQL
Vinyl Chloride	BPQL	BPQL	BPQL
2-Chloroethylvinyl Ether	BPQL	BPQL	BPQL
Chloroethane	BPQL	BPQL	BPQL
Methylene Chloride	BPQL	BPQL	BPQL
Trichloroethylene	BPQL	BPQL	BPQL
Trichlorofluoromethane	BPQL	BPQL	BPQL
1,1-Dichloroethene	BPQL	BPQL	BPQL
1,1-Dichloroethane	BPQL	BPQL	BPQL
c or t-1,2-Dichloroethylene	BPQL	BPQL	BPQL
Chloroform	BPQL	BPQL	BPQL
1,2-Dichloroethane	BPQL	BPQL	BPQL
1,1,1-Trichloroethane	BPQL	BPQL	BPQL
Carbon Tetrachloride	BPQL	BPQL	BPQL
Bromodichloromethane	BPQL	BPQL	BPQL
1,2-Dichloropropane	BPQL	BPQL	BPQL
t-1,3-Dichloropropene	BPQL	BPQL	BPQL
c-1,3-Dichloropropene	BPQL	BPQL	BPQL
1,1,2,2-Tetrachloroethane	BPQL	BPQL	BPQL
1,1,2-Trichloroethane	BPQL	BPQL	BPQL
Tetrachloroethylene	BPQL	BPQL	BPQL
Chlorobenzene	BPQL	BPQL	BPQL
1,4-Dichlorobenzene	BPQL	BPQL	BPQL
1,3-Dichlorobenzene	BPQL	BPQL	BPQL
1,2-Dichlorobenzene	BPQL	BPQL	BPQL
% Solids	94	86	83

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride
2 ppb for All other parameters.

Page 8 of 9

LABORATORY REPORT

CLIENT NAME: The Johnson Company	DATE OF SAMPLE: 10/12/91
PROJECT NAME: Howard Bank, Burlington	DATE OF RECEIPT: 10/16/91
LABORATORY NO: 1488-91	DATE OF ANALYSIS: 10/25/91
PROJECT NO: 78611	DATE OF REPORT: 11/6/91
ATTENTION: Brad Wheeler	

PARAMETER	QC DATA SPIKE RECOVERY		
	10-3	6-4	11-10
Chloromethane	---	---	---
Bromoform	---	---	---
Bromomethane	---	---	---
Dibromochloromethane	---	---	---
Vinyl Chloride	---	---	---
2-Chloroethylvinyl Ether	---	---	---
Chloroethane	---	---	---
Methylene Chloride	118	79	87
Trichloroethylene	101	97	89
Trichlorofluoromethane	---	---	---
1,1-Dichloroethene	106	89	93
1,1-Dichloroethane	99	87	87
c or t-1,2-Dichloroethylene	---	---	---
Chloroform	97	89	87
1,2-Dichloroethane	---	---	---
1,1,1-Trichloroethane	---	---	---
Carbon Tetrachloride	97	96	94
Bromodichloromethane	---	---	---
1,2-Dichloropropane	98	90	88
t-1,3-Dichloropropene	---	---	---
c-1,3-Dichloropropene	---	---	---
1,1,2,2-Tetrachloroethane	---	---	---
1,1,2-Trichloroethane	98	101	95
Tetrachloroethylene	102	92	93
Chlorobenzene	102	77	91
1,4-Dichlorobenzene	---	---	---
1,3-Dichlorobenzene	---	---	---
1,2-Dichlorobenzene	---	---	---

EPA Method 8010; All results reported as ug/kg or ppb, dry weight.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride

2 ppb for All other parameters.

Respectfully Submitted,
SCITEST, INC.

Roderick J. Lamothe
Roderick J. Lamothe
Laboratory Director

APPENDIX B

DRILLING AND WELL CONSTRUCTION LOG FOR MONITORING WELL 1

The Johnson Company, Inc.
Environmental Sciences and Engineering
5 State Street
Montpelier, Vermont 05602

DRILLING LOG

WELL # MW-1

Project: 228 N. Winslow Ave.
Location: Burlington, Vermont
Job # 1-C226-2
Logged By: BAW
Date Drilled: 10/12/91
Driller: Tri-State
Drill Method: hollow Stem Auger

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 49.5 ft.
Screen Type: PVC
Screen Diameter: 2.0 in.
Screen Length: 10.0 ft.
Slot Size: 10/60

Total Pipe: 59.5 ft.
Stick Up: 0.0 ft.
Total Hole Depth: 59.5 ft.
Well Guard Length: 2.0 ft.
Initial Water Level: 52.1 ft.
Surface Elevation: -
T.O.W. Elevation: -

■ = Sampled interval

Sheet 1 of 1

Depth feet	Well Construction	Notes	Geology	PID Reading*	Description
0	Well Guard			0.3ppm	0'-1': dark brown loamy fine sand
2	Cement				
4	Bentonite				
6		Fine Sand		0.3ppm	5'-7': brown loamy fine sand
8		Fill Material			
10				0.1ppm	10'-12': dark brown fine sandy loam fill; some ashy fill
12					
14				0.3ppm	15'-17': light brown fine sand; brown moist fine sandy loam from 16.5'-17'
16					
18				0.2ppm	20'-22': brown fine sand
20		Fine Sand			
22					
24		Backfill		0.1ppm	25'-27': gray fine sand, few orange mottles, dry
26					
28				0.1ppm	30'-32': gray fine sand, common orange mottles, dry
30					
32				0.8ppm	35'-37': gray silt loam, damp
34					
36				0.5ppm	40'-42': gray silt loam, moist
38					
40				0.1ppm	45'-47': gray very fine sandy loam, nearly dry
42		Silt Loam			
44					
46		Bentonite		0.1ppm	50'-52': light brown very fine sandy loam, moist at 51.5'
48					
50				0.1ppm	55'-57': gray silt loam, moist-wet
52					
54		Sand Pack		0.1ppm	60'-62': gray silty clay loam & silt loam, moist-wet
56		Screen			
58					
60					
62					
64					
66					
68					
70					
72					
74					
76					
78					
80					
82					
84					
86					

APPENDIX C

GROUNDWATER SAMPLING LABORATORY DATA SHEET

LABORATORY REPORT

CLIENT NAME:	The Johnson Company	DATE OF SAMPLE:	10/21/91
PROJECT NAME:	Howard Bank, Burlington, VT	DATE OF RECEIPT:	10/22/91
LABORATORY NO:	1491-91	DATE OF ANALYSIS:	10/28/91
PROJECT NO:	78611	DATE OF REPORT:	11/6/91
ATTENTION:	Brad Wheeler		

PARAMETER

MW - 1

Chloromethane	BPQL
Bromoform	BPQL
Bromomethane	BPQL
Dibromochloromethane	BPQL
Vinyl Chloride	BPQL
2-Chloroethylvinyl Ether	BPQL
Chloroethane	BPQL
Methylene Chloride	BPQL
Trichloroethylene	BPQL
Trichlorofluoromethane	BPQL
1,1-Dichloroethene	BPQL
1,1-Dichloroethane	BPQL
c or t-1,2-Dichloroethylene	BPQL
Chloroform	BPQL
1,2-Dichloroethane	BPQL
1,1,1-Trichloroethane	BPQL
Carbon Tetrachloride	BPQL
Bromodichloromethane	BPQL
1,2-Dichloropropane	BPQL
t-1,3-Dichloropropene	BPQL
c-1,3-Dichloropropene	BPQL
1,1,2,2-Tetrachloroethane	BPQL
1,1,2-Trichloroethane	BPQL
Tetrachloroethylene	13
Chlorobenzene	BPQL
% Surrogate Recovery	95%

EPA Method 601; All results reported as ug/l or ppb.

BPQL = Below Practical Quantitation Limit.

5 ppb for Bromoform, 2-Chloroethylvinyl Ether, & Methylene Chloride
1 ppb for All other parameters.

Respectfully Submitted,
SCITEST, INC.

Roderick J. Lamothe
Roderick J. Lamothe
Laboratory Director

RJL/cha

APPENDIX D

CHAIN OF CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

RECEIVED

Client/Project Name <i>Howard Bank - 240 N. Winooski Ave</i>			Project Location <i>Burlington, VT</i>			ANALYSED OCT 17 1991 THE JOHNSON CO., INC. MONTPELIER, VERMONT					
Project No. <i>1-0720-2 (44)</i>			Field Logbook No. _____								
Sampler: (Signature) <i>Brad A. Wheeler / WSP</i>			Chain of Custody Tape No. <i>JCO-667</i>								

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	# of subs	2010 (perc)	percent solids											REMARKS
1-4	10/15/91	6:55		soil	1	✓	✓											Not received
6-1					1	✓	✓											
6-3					1	✓	✓											
8-4					1	✓	✓											
9-1					1	✓	✓											
10-1					1	✓	✓											
1-1					1	✓	✓											
7-4					1	✓	✓											

Relinquished by: (Signature) <i>Brad A. Wheeler / WSP</i>		Date 10/15/91	Time 7:30	Received by: (Signature) <i>James R. Bower</i>		Date 10/15/91	Time 7:50
Relinquished by: (Signature) <i>James R. Bower</i>		Date 10/15/91	Time 6:30 ^{PM}	Received by: (Signature) <i>Not a signature</i>		Date 10/15/91	Time 8:30 ^{PM}
Relinquished by: (Signature)		Date	Time	Received for Laboratory: (Signature) <i>Not a signature</i>		Date 10/16/91	Time 7:55
Sample Disposal Method:		Disposed of by: (Signature)				Date	Time

SAMPLE COLLECTOR 5 State Street Montpelier, VT 05602 (802) 229-4600 Fax: (802) 229-5876	THE JOHNSON COMPANY, INC. Environmental Sciences and Engineering	ANALYTICAL LABORATORY <i>Soil test</i> <i>Jim Bower</i>
---	--	---

CHAIN OF CUSTODY RECORD

Client/Project Name <i>Howard Benton 120 N. Worcester Ave</i>				Project Location <i>Burlington, VT</i>				<div style="position: relative; height: 100px;"> <div style="position: absolute; top: 0; right: 0; text-align: right;"> RECEIVED ANALYSIS OCT 17 1991 THE JOHNSON CO., INC. MONTPELIER, VERMONT </div> </div>			
Project No. <i>1-0620-2 (44)</i>				Field Logbook No. 							
Sampler: (Signature) <i>Brad A. Wheeler / WPD</i>				Chain of Custody Tape No. <i>JCO-687</i>							

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	# of Vials	80/10 (perc)	Percent Solids	REMARKS
11-1	10-13-91	8:00		SOIL	1	✓	✓	NOT PREPARED
11-2		8:30			1	✓	✓	
11-3		8:50			1	✓	✓	
11-4		9:10			1	✓	✓	
11-5		9:30			1	✓	✓	
11-6		9:50			1	✓	✓	
11-7		10:10			1	✓	✓	
11-8		10:30			1	✓	✓	
11-9		10:50			1	✓	✓	
11-10		11:10			1	✓	✓	
11-11		11:30			1	✓	✓	
11-12		11:50			1	✓	✓	
11-13		12:10			1	✓	✓	
11-14		12:30			1	✓	✓	
11-15		12:50			1	✓	✓	
11-16		1:10			1	✓	✓	
11-17		1:30			1	✓	✓	
11-18		1:50			1	✓	✓	
11-19		2:10			1	✓	✓	
11-20		2:30			1	✓	✓	
11-21		2:50			1	✓	✓	
11-22		3:10			1	✓	✓	
11-23		3:30			1	✓	✓	
11-24		3:50			1	✓	✓	
11-25		4:10			1	✓	✓	
11-26		4:30			1	✓	✓	
11-27		4:50			1	✓	✓	
11-28		5:10			1	✓	✓	
11-29		5:30			1	✓	✓	
11-30		5:50			1	✓	✓	

Relinquished by: (Signature) <i>Brad A. Wheeler / WPD</i>		Date <i>10/15/91</i>	Time <i>7:30</i>	Received by: (Signature) <i>James R. Bowes</i>		Date <i>10/15/91</i>	Time <i>7:30</i>
Relinquished by: (Signature) <i>James R. Bowes</i>		Date <i>10/15/91</i>	Time <i>6:30 PM</i>	Received by: (Signature) <i>John S. [Signature]</i>		Date <i>10/15/91</i>	Time <i>8:30</i>
Relinquished by: (Signature)		Date	Time	Received for Laboratory: (Signature) <i>John S. [Signature]</i>		Date <i>10/16/91</i>	Time <i>7:55</i>
Sample Disposal Method:		Disposed of by: (Signature)				Date	Time

SAMPLE COLLECTOR 5 State Street Montpelier, VT 05602 (802) 229-4600 Fax: (802) 229-5876	ANALYTICAL LABORATORY <i>James R. Bowes</i> <i>John S. [Signature]</i> <i>Jim Bowes</i>
---	--

CHAIN OF CUSTODY RECORD

Client/Project Name Howard Burke - 226 N. Winslow Ave.			Project Location Burlington, VT			<div style="text-align: center;">ANALYSES</div> <div style="font-size: 2em; font-weight: bold; margin: 10px 0;">RECEIVED</div> <div style="font-size: 1.2em; margin: 5px 0;">OCT 17 1991</div> <div style="font-size: 0.8em;">THE JOHNSON CO., INC. MONTPELIER, VERMONT</div>					
Project No. 1-06-20-2 (46)			Field Logbook No. -----								
Sampler: (Signature) Brad A. Wheeler / JCO			Chain of Custody Tape No. JCO-027								
Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	# of Vials	80/10 (Acres)	Percent Solids	REMARKS			
6-1	10-12-91	1:30		Soil	1	✓	✓	not preserved			
6-2		1:30			1	✓	✓	✓			
6-3		1:30			1	✓	✓	✓			
6-4		1:30			1	✓	✓	✓			
6-5		1:30			1	✓	✓	✓			
6-6		1:30			1	✓	✓	✓			
6-7		1:30			1	✓	✓	✓			
6-8		1:30			1	✓	✓	✓			
6-9		1:30			1	✓	✓	✓			
6-10		1:30			1	✓	✓	✓			
6-11		1:30			1	✓	✓	✓			
6-12		1:30			1	✓	✓	✓			
6-13		1:30			1	✓	✓	✓			
6-14		1:30			1	✓	✓	✓			
6-15		1:30			1	✓	✓	✓			
6-16		1:30			1	✓	✓	✓			
6-17		1:30			1	✓	✓	✓			
6-18		1:30			1	✓	✓	✓			
6-19		1:30			1	✓	✓	✓			
6-20		1:30			1	✓	✓	✓			
Relinquished by: (Signature) Brad A. Wheeler / JCO				Date 10/15/91	Time 7:30	Received by: (Signature) James P. Bowers			Date 10/15/91	Time 7:30	
Relinquished by: (Signature) James R. Bowers				Date 10/15/91	Time 6:30 P	Received by: (Signature) [Signature]			Date 10/15/91	Time 8:30 P	
Relinquished by: (Signature)				Date	Time	Received for Laboratory: (Signature) [Signature]			Date 10/16/91	Time 7:55	
Sample Disposal Method:				Disposed of by: (Signature)					Date	Time	
SAMPLE COLLECTOR				ANALYTICAL LABORATORY							
5 State Street Montpelier, VT 05602 (802) 229-4600 Fax: (802) 229-5876				THE JOHNSON COMPANY, INC. Environmental Sciences and Engineering							
				SCITEST via Priority Express Jim Bowers							

3.0 GROUNDWATER SAMPLING

3.1 MONITORING WELL INSTALLATION

One groundwater monitoring well was installed on the site so that the groundwater could be sampled and analyzed for tetrachloroethene. The well was drilled to 60 feet bgs. Soil samples were collected ahead of the hollow stem auger at five foot intervals using a split spoon sampler. The well was constructed using 10 feet of screened section from 49.5 to 59.5 feet bgs. A sand pack was placed around the screen and above it to 47.5 feet bgs. A bentonite plug two feet thick was placed above the sand pack. From 45.5 to 4 feet bgs the hole was backfilled with the auger spoil. Two feet of bentonite plug was placed above the backfill, and cement was placed above the bentonite to the ground surface. A road box was anchored into this cement, and set flush with the ground surface. The well was secured with a locking well cap. It was installed on October 12, 1991 and it was sampled on October 21, 1991. A second sample was collected from the same well on November 14, 1991. The groundwater samples were sent to Scitest Laboratory in Randolph, Vermont for analysis using EPA method 601. The drilling and well construction log for the monitoring well is in Appendix B.

3.2 RESULTS

The laboratory analysis of the first groundwater sample collected from this well detected a tetrachloroethene concentration of 13 ppb. No other compounds were detected in this sample. The second sample collected on November 14, 1991 was shown to contain 42 ppb of tetrachloroethene. The Vermont Groundwater Protection Rule and Strategy Enforcement Standard for tetrachloroethene is 0.7 ppb. The laboratory data sheet for the groundwater sample is in Appendix C. The data sheet for the November 14 sample was not available at the time that this report was finalized.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

The data collected from this phase of the investigation has allowed us to further characterize the nature of the tetrachloroethene contamination at this site. The following is a summary of the key information derived from the data.

1. The soils with the highest concentrations of tetrachloroethene are found in the northwestern corner of the property.
2. The vertical extent of the contaminated soils is not clearly defined, but based on the data collected, it is likely that the contamination is diminished below 20-30 feet bgs. This conclusion is based on the following observations: the three samples from hole number 11, which were collected from below 30 feet bgs, were all "clean" and the material that is most typically contaminated at higher levels is the ashy fill (as discussed in section 2.2), which is not likely to be found at depths below 20-30 feet bgs.

3. It is likely that the contamination extends beyond the northern property line of 228 North Winooski Avenue.
4. The water table at this property was measured to be greater than 50 feet bgs. The two groundwater samples that were collected showed tetrachloroethene contamination at levels exceeding the Vermont Enforcement Standard for groundwater. Pat Lovejoy, of the Burlington Public Works Water Division, informed us that the homes and businesses in this area are served by the Burlington municipal water supply system. The Winooski River is approximately 2,400 feet from this site and Lake Champlain is approximately 4,200 feet from the site.
5. The site is paved, causing precipitation to run-off as overland flow rather than percolating into and infiltrating through the soils. Therefore, infiltration of water through the contaminated soils is non-existent or occurs at a very low volumetric rate. Since such infiltration must occur if leachate is to be generated and transported to the water table, it is reasonable to conclude that the groundwater contamination may originate from off site.
6. At least five instances in the sampling data support the concept of only limited leaching occurring on this site. These examples are seen where higher levels of contamination directly overlie samples which have lower concentrations. These are as follows:

<u>SAMPLE #</u>	<u>DEPTH (ft)</u>	<u>TETRACHLOROETHENE (ppb)</u>
6-2	5-7	16
6-3	10-12	2
9-1	1	8
9-2	5-7	BPQL
10-2	5-7	77
10-3	10-12	BPQL
11-3	10-12	104
11-4	15-17	17
11-7	30-32	BPQL
12-2	5-7	77
12-3	10-12	BPQL

4.2 RECOMMENDATIONS

Two exposure pathways for the contamination at this site require consideration in determining whether or not remediation at the site is needed. The first pathway is whether the soils present a risk to people through direct contact. The U.S. EPA manual RCRA Facility Investigation (RFI) Guidance, Volume 1 provides a table (Table 8-6 Health-Based Criteria for Carcinogens) that indicates that the oral exposure route risk specific dose for tetrachloroethene is 140 parts per million (ppm). The highest concentration detected from the 33 soil samples collected from this part of the site was 382 ppb, or 0.382 ppm. The mean for the samples is 42.9 ppb or 0.043 ppm. In addition, the contaminated soils are located under an asphalt parking area and are not accessible for human contact unless they are excavated. Based on this information, it is apparent that the health risks associated with direct contact with the soils at this site as established in US EPA guidelines, do not warrant soil remediation.

The second consideration is whether the contamination in the soils on the site is causing the contamination of the groundwater. The soil sampling analysis indicated that the soils that were analyzed between 30 and 62 feet bgs (three samples from SS-11, 30-32 feet bgs, 45-47 feet bgs and 60-62 feet bgs) on this site were not contaminated, or had levels of tetrachloroethene below the laboratory detection limit of 2 ppb. The soil boring from which these soil samples were taken is approximately 20 feet from the northern property line. Because the ground surface above the contaminated soils on this site is covered with asphalt paving, it does not appear likely that the contamination detected in the groundwater sample from this site is caused by leaching of the contamination documented in the soils at this site. As discussed in section 2.2 of this report, the soil analysis results indicate that it is likely that the soil contamination documented at this site extends beyond the northern property line of 228 North Winooski Avenue. The information we have collected at the 228 North Winooski Avenue property indicates that it is possible that the groundwater is being contaminated from a source off the property. We do not believe that soil remediation efforts carried out on the 228 North Winooski Avenue property would be effective in correcting the contamination of the groundwater at this site.

In summary, the soils and the groundwater at this site have been shown to be contaminated by tetrachloroethene at levels exceeding the Vermont Enforcement Standards. However, the information collected also indicates that the soil contamination is not at concentrations high enough to be considered a health hazard through direct contact and that the groundwater contamination may not originate from the soil contamination at the site. This leads to two conclusions: 1) it is not necessary to conduct remedial efforts at this site to clean up the soils from a direct exposure standpoint and; 2) soil remediation at this site would not be effective as a means to clean up the groundwater.

We do not recommend any further investigation or remedial work be conducted on this site at this time. We believe that further characterization of the tetrachloroethene contamination in this area would be most effectively carried out beyond the limits of the 228 North Winooski Avenue property.

5.0 LIMITATIONS

This investigation was based on sound scientific investigative techniques and experience with similar investigations. However, the conclusions are based on limited data and must be viewed in this light.

Reviewed by: SEP

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